DEPARTMENT OF THE NAVY
NAVAL AIR SYSTEMS COMMAND
NAVAL AIR SYSTEMS COMMAND HEADQUARTERS
WASHINGTON, DC 20361-0001

IN REPLY REFER TO

NAVAIRINST 3750.6A
AIR-4213M
17 Jan 90

NAVAIR INSTRUCTION 3750.6A

From: Commander, Naval Air Systems Command

Subj: PREVENTION OF FOREIGN OBJECT DAMAGE TO GAS TURBINE ENGINES

Ref: (a) OPNAVINST 3750.6P
(b) OPNAVINST 4790.2E
(c) NAVAIRINST 10290.2B

Encl: (1) IMA/NAVAVNDEPOT Monthly FOD Summary Report
(2) Message Format for NAVAIR Quarterly FOD Summary Report

1. Purpose. To establish policy and procedures for the Foreign Object Damage (FOD) Prevention Program within the Naval Air Systems Command (NAVAIR).

2. Cancellation. This instruction supersedes NAVAIR Instruction 3750.6 of 19 October 1987. Since this is a major revision, changes have not been indicated.

3. Discussion

a. Damage to gas turbine engines from ingestion of foreign objects continues to plague naval aviation. FOD is hazardous to personnel safety, seriously degrades mission capability, and is cost prohibitive. The cost and time involved in the repair of engines damaged by foreign objects depletes limited repair funds and capacity, and impacts commensurately on other programs. Since most FOD is preventable, a continuing and dedicated FOD prevention program is mandatory.

b. Following the guidance and procedures contained in references (a), (b), and (c), an effective FOD prevention program must heighten awareness, requires active participation, and incorporates sound, safe operating procedures, and maintenance practices. Additionally, in the wake of a FOD incident, immediate and thorough investigation into the cause must be conducted so that meaningful corrective action can be initiated. An in-depth analysis of the damage, including FOD residue, can enhance identification of the foreign object and any procedural errors contributing to the incident. Quality Assurance (QA) should be a key part of any investigation. Failure to identify the cause of FOD may reflect lack of sufficient effort, rather than lack of resources, talent, or ability.

c. The number of engines damaged by loose hand tools has decreased since the introduction of tool control programs. This success points out the absolute necessity for implementing operating and maintenance procedures that ensure strict accountability of all materials used. NAVAIR reporting custodians and field activities will, either organically or contractually, comply with this instruction and reference (c), and maintain positive tool control throughout all operations in support of the FOD Prevention Program. Personal equipment such as head gear, helmet bags, charts, lunch boxes, and maintenance consumables (e.g., safety wire, nuts, bolts, washers, pins, rivets, etc.) used during operation or maintenance of aircraft, engines, and support equipment must be rigidly controlled.

4. Definitions

a. Foreign Object Damage (FOD). Damage to a gas turbine engine that exceeds serviceable limits and is caused by ingestion of objects not organic to the affected engine. Internal engine component failure and the damage resulting from such failure will be reported via the maintenance data collection system, reference (b), rather than be interpreted or reported as FOD. If flight safety is involved, report to the engine cognizant field activity (CFA) via the hazardous material report/engineering investigation request, reference (b), and, if appropriate, via the hazard/mishap report system, reference (a). Minor roughness or erosion of blades or vanes, within serviceable limits, will not be interpreted or reported as FOD.

b. Minor FOD. Damage which is repaired at the organizational or intermediate level at a total man-hour and material cost that does not exceed the greater of 3,000 dollars or 10 percent of the reportable repair cost, as periodically promulgated by the Naval Safety Center (NAVSAFECEN). FOD discovered in engines removed for scheduled major engine inspections, when engine performance and/or operability has not been affected, will also be classified as minor FOD.

c. Major FOD. Foreign object damage for which an installed engine is removed, or damage which exceeds the above cost, man-hour, and repair level threshold.

5. Action

a. All units operating aircraft, engines, or support equipment, or performing related maintenance (including the manufacture/overhaul of component parts), and those directly supporting flight operations, will take aggressive action to prevent FOD. Unit FOD prevention programs will incorporate the spirit and intent of FOD program elements delineated in reference (b) and this instruction. Additional innovative FOD program elements, tailored to the type equipment and local operational and maintenance environment, are also necessary and expected.

b. Each unit will designate a FOD prevention officer and form a command FOD prevention team. The FOD prevention, safety, and quality assurance (QA) officer will be included in the membership of the FOD prevention team. The team is responsible to the commanding officer for carrying out the FOD program on a day-to-day basis. It must provide the leadership to ensure that all hands participate in FOD prevention and take the lead when FOD prevention requires corrective action. The Naval Aviation Depot (NAVAVNDEPOT) FOD prevention committee, the functional counterpart of the FOD prevention team, is governed by the provisions of reference (b).

c. All FOD, including that which occurs as the direct result of an aircraft mishap, will be reported following procedures in references (a), (b), and this instruction.

d. FOD rates are computed by dividing the number of major FOD incidents by the number of flight hours, and are expressed in FOD incidents per one thousand flight hours. Minor FOD is not included in unit or Type Commander (TYCOM) FOD rates. FOD which occurs as a direct result of an aircraft mishap, when the reportable cost of the mishap, exclusive of engine damage, meets the criteria for reporting as a class A, B, or C mishap, is also not included in FOD rates. Accuracy in reporting FOD costs is essential for proper categorization of FOD incidents. When the Organizational Maintenance Activity (OMA) reported repair costs differ from the reported Intermediate Maintenance Activity (IMA) repair costs, the IMA costs will be used. When neither OMA or IMA costs are indicated, the reportable repair costs promulgated by NAVSAFECEN will be used.

e. Reporting Custodians will

(1) develop and maintain a unit instruction containing the FOD prevention program requirements of reference (b), this instruction and locally developed program elements;

(2) develop formal and on-the-job indoctrination and training programs for all assigned personnel, tailored to individual operating and maintenance environments, and emphasizing FOD awareness and prevention rather than inspection and correction;

(3) establish and enforce an effective fastener control program. Investigate the cause of missing or loose fasteners, and take immediate action to correct or eliminate those causes;

(4) indoctrinate aircrews in FOD prevention measures such as maintaining prudent taxi and takeoff intervals, and avoiding taxiing through the exhaust blast or propeller wash of other aircraft. Instruct aircrews to avoid, when possible, known icing and bird hazards, and to report all observed FOD hazards. Ensure aircrews are briefed to pay particular attention to areas

of the aircraft which have had recent maintenance performed, and to inspect areas adjacent to their aircraft for foreign objects before manning the aircraft;

(5) when using in-flight refueling stores, ensure that the refueling basket is inspected, in proper repair, and cleared of debris before each flight;

(6) inspect maintenance turn-up screens for integrity of mesh and attaching hardware, and for general material condition prior to each use. Use only those screens that are in satisfactory material condition;

(7) take immediate action to correct work habits, elements of physical environment, or maintenance procedures which contribute to FOD. Report discrepancies which require resolution above your level to higher authority;

(8) require a FOD inspection of aircraft coming out of phase maintenance, extensive corrosion control, engine or major component change, or after extended downtime, as part of the QA inspection;

(9) conduct a thorough investigation of each FOD incident. If the cause cannot be determined at the unit level, use of the onboard supporting activity's FOD prevention and investigating team is mandatory. An engineering investigation of obvious FOD will not be requested until the supporting IMA or cognizant NAVAVNDEPOT (for aircraft in its reporting custody) has completed its investigation;

(10) make miscellaneous page entries in the Aeronautical Equipment Service Record (AESR) indicating the extent and cause of major and minor foreign object damage. Include the Visual Information Display System/Maintenance Action Form (VIDS/MAF) Job Control Number (JCN), and the date-time-group and serial number of naval message FOD incident reports in AESR entries; and

(11) submit reports as specified in paragraph 6 of this instruction. A copy of the FOD incident report must accompany all FOD related engine retrogrades.

f. Intermediate and Depot Maintenance Activities will

(1) develop and maintain a department instruction containing the FOD prevention program requirements of reference (b), TYCOM, and other cognizant authority directives, and locally developed program elements related to test cell operation and shop practices;

(2) screen the AESR of all not Ready-for-Issue (non-RFI) engines for FOD related entries;

(3) inspect all engines inducted for inspection or repair for evidence of FOD. For those engines found to have FOD, identify the actual or evidenced foreign object(s) involved, using residual material recovered or location, pattern, distribution, type and extent of damage to fan, compressor, and turbine sections;

(4) provide cause-of-FOD feedback to engine operating activities and all other concerned activities;.

(5) assist onboard FOD prevention and investigation teams in FOD mishap investigation efforts; and

(6) submit reports as specified in paragraph 6 of this instruction.

g. Navy Plant Representative Office (NAVPRO) will comply with applicable reporting custodian and reporting responsibilities of this instruction, as specified in paragraphs 5e(9), 5e(10), 5e(11), and 6a.

6. Reporting Requirements. Use Standard Subject Identification Code (SSIC) N04790 on all message FOD reports.

a. Reporting Custodian, IMA, NAVAVNDEPOT, and NAVPRO will

(1) submit a FOD incident message report on all major FOD, following reference (b) format and criteria.

(2) Navy Plant Representative Office (NAVPRO). Foreign object damaged engines installed in U.S. Navy-owned aircraft in the reporting custody of the NAVPRO, or provided as Government Furnished Equipment (GFE) in contractor-owned aircraft will be reported following reference (b) format and criteria.

b. IMA and NAVAVNDEPOTS will

(1) submit a monthly summary of all engines inducted during the previous month which were determined to have major FOD damage. Report not later than the 5th day of each month using the format of enclosure (1). Report each engine only once. An engine still in work that was previously reported should not appear on the current report. Negative reports are not required.

(2) submit a report via the monthly FOD summary report, enclosure (1) for major FOD first discovered but not occurring at the IMA or NAVAVNDEPOT (i.e., performance or operability degradation is obvious but OMA AESR entries, copies of FOD incident reports, and VIDS/MAF documentation are absent).

c. Naval Aviation Maintenance Office (NAVAVNMAINTOFF) will submit a quarterly summary of major FOD. Report not later than the 20th day of the 1st month of the quarter using the format of enclosure (2).

d. Required message addressees for FOD reports

(1) FOD incident/monthly summary reports

(a) Action addressees. Commander, Naval Air Systems Command (COMNAVAIRSYSCOM) and NAVAVNMAINTOFF. NAVAVNDEPOT reports will be addressed to the Naval Aviation Depot Operations Center (NAVAVNDEPOTOPSCEN) as well.

(b) Information addressees. As a minimum, the engine CFA. Commander, Naval Air Force Atlantic Fleet (COMNAVAIRLANT) and Commander, Naval Air Force Pacific Fleet (COMNAVAIRPAC) should be action or information addressees as appropriate.

(2) FOD quarterly summary reports

(a) Action addressee is COMNAVAIRSYSCOM. NAVAIR for AIR-09F.

(b) Information addressees. NAVAIR reporting custodian or field activity. Commander, Space and Naval Warfare Systems Command (COMSPAWARSYSCOM) and Chief of Naval Research (CNR), as appropriate.

e. Non-Department of the Navy engines will be reported following the requirements of the cognizant service or agency. Include NAVSAFECEN and COMNAVAIRSYSCOM as information addressees.

f. Mishap report. When more than engine damage is involved, the engine damage costs, aircraft damage costs, and other related damage costs will be summed to determine whether a mishap report must also be submitted following procedures in reference (a).

7. Reports

a. The reporting requirements contained in paragraph 6a above are exempt from reports control by SECNAV Instruction 5214.2B.

b. Report Symbol NAVAIR 4790-7 has been assigned to the reporting requirement in paragraph 6b above and is approved for 3 years only from the date of this instruction.

c. Report Symbol NAVAIR 4790-8 has been assigned to the reporting requirement in paragraph 6c above and is approved for 3 years only from the date of this instruction.

8. Forms. OPNAV 4790/60, Visual Information Display System/Maintenance Action Form, S/N 0107-LF-002-5900 is available in the Navy supply system and may be requisitioned per NAVSUP P-2002.

R. C. GENTZ

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MESSAGE FORMAT FOR IMA OR NAVAVNDEPOT MONTHLY FOD SUMMARY REPORT

UNCLAS //N04790//

SUBJ: (Command submitting report) IMA OR NAVAVNDEPOT FOD REPORT FOR (month/last two digits of calendar year) REPORT SYMBOL NAVAIR 4790-7

A. NAVAIRINST 3750.6A

1. DATA: (For each major engine FOD reported, provide the following data in columns labeled as shown below: (1) ACT (Reporting custodian at time of engine removal from aircraft); (2) TMS (Engine type/model/series); (3) SER NO (Engine serial number); (4) REASON FOR REMOVAL (From organizational level VIDS/MAF and/or AESR entries); (5) DATE (YY/MM/DD date of engine removal from aircraft); (6) DISP (Disposition: BCM, Repair, Survey, etc.); (7) REPAIR COST (Sum of man-hour and material repair cost for FOD only. Actual cost, if known. Accurate estimate if actual cost unknown. Use reportable repair cost from NAVSAFECEN Norfolk VA 061710Z May 88 or superseding if less than actual or estimated cost.)

ACT TMS SER NO REASON-FOR-REMOVAL DATE DISP REPAIR COST

2. FINDINGS: (Report physical evidence of FOD discovered in each engine, using engine serial number to identify each engine.)

3. ANALYSIS: (Identify suspected or known cause of FOD by engine serial number, and support with brief analysis of evidence.)

4. REMARKS: (1) If engine received FOD on test cell, state corrective action taken or recommended. (2) If engine is BCM, list serial number and receiving activity. (3) Other remarks as appropriate.

5. POINT OF CONTACT: (State rank, rate, name, title, and AUTOVON number of command point of contact for the report.)

MESSAGE FORMAT FOR NAVAIR QUARTERLY FOD SUMMARY REPORT

UNCLAS //N04790//

SUBJ: NAVAIR FOD SUMMARY FOR (First, Second, Third, or Fourth) QUARTER CY-(year) REPORT SYMBOL NAVAIR 4790-8

A. NAVAIRINST 3750.6A

1. DATA: (Provide the following data in columns as shown below: (1) (X) QTR FLIGHT HOURS (Reporting command's total quarterly flight hours); (2) (X) QTR MAJOR FODS (Number of major FOD incidents per quarter); (3) (X) QTR MAJOR FOD RATE (Number of FOD incidents per 1000 flight hours); (4) CY-(year) FLIGHT HOURS (Cumulative calendar year flight hours); (5) CY-(year) MAJOR FODS (Cumulative number of calendar year major FOD incidents); (6) CY-(year) MAJOR FOD RATE (Cumulative number of FOD incidents per 1000 flight hours))

NOTE: (X)=number of quarter; (XX)=last two digits of year

(X) QTR FLIGHT HOURS	(X) QTR MAJOR FODS	(X) QTR MAJOR FOD RATE	CY-(XX) FLIGHT HOURS	CY-(XX) MAJOR FODS	CY-(XX) MAJOR FOD RATE

2. REMARKS: (Comments concerning the command's trend in FOD prevention and recommendations aimed at improving the overall FOD prevention effort.)